EXERCISES

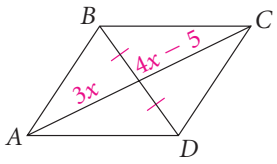
For more practice, see *Extra Practice.*

Practice and Problem Solving

A Practice by Example **Algebra** **Find the values of x and y for which $ABCD$ must be a parallelogram.**

Example 1 (page 305)

1.



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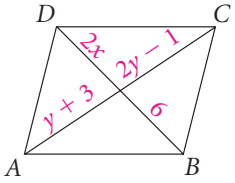

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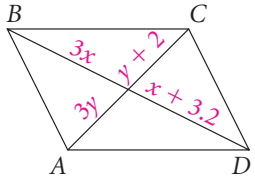

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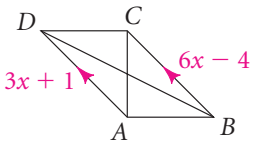

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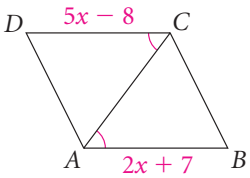

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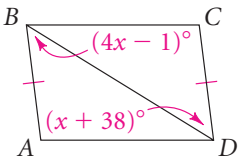

Example 2 (page 306)

Determine whether the quadrilateral must be a parallelogram. Explain.

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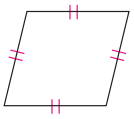

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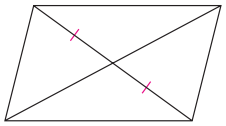

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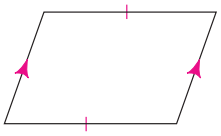

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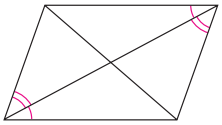

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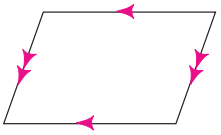

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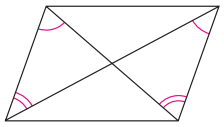

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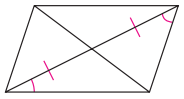
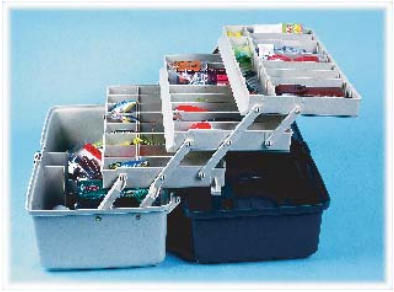


Example 3 (page 306)

16. Fishing Quadrilaterals are formed on on the side of this fishing tackle box by the adjustable shelves and connecting pieces. Explain why the quadrilaterals remain parallelograms no matter what position the shelves are in.

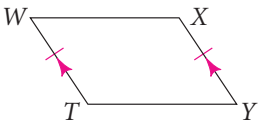


B Apply Your Skills Proof

17. Developing Proof Complete this plan for a proof of Theorem 6-6.

Given: $\overline{TW} \parallel \overline{YX}$ and $\overline{TW} \cong \overline{YX}$

Prove: $TWXY$ is a parallelogram.



Plan: Draw diagonals $\overline{TX}$ and $\overline{WY}$ intersecting at R. Now, $TWXY$ is a parallelogram if the diagonals **a.** ? each other. $\overline{WR} \cong \overline{YR}$ and $\overline{TR} \cong$ **b.** ? by CPCTC if $\triangle TWR \cong$ **c.** ?. These triangles are congruent by **d.** ? because $\overline{TW} \parallel \overline{YX}$ and **e.** ? angles are congruent.

18. Combine Theorems 6-1 and 6-7 into a biconditional statement.

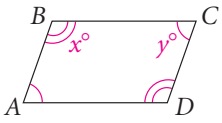
Need Help?

For Exercise 18, you can review biconditionals in Lesson 2-2.

19. Developing Proof Complete the two-column proof of Theorem 6-8.

Given: $\angle A \cong \angle C$ and $\angle B \cong \angle D$

Prove: $ABCD$ is a parallelogram.



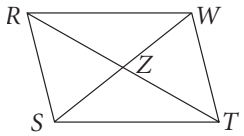
Need Help?

$x + y + x + y = 2x + 2y$
$= 2(x + y)$

The last step is the Distributive Property.

Statements	Reasons
1. $x + y + x + y = 360$	**1.** The sum of the measures of the angles of a quadrilateral $= 360$.
2. $2(x + y) = 360$	**a.** ?
3. $x + y = 180$	**b.** ?
4. $\angle A$ and $\angle B$ are supplementary. $\angle A$ and $\angle D$ are supplementary.	**4.** Definition of supplementary
c. ? $\parallel$?, ? $\parallel$?	**d.** ?
6. $ABCD$ is a parallelogram.	**e.** ?

Developing Proof **State whether the given information is enough to conclude that *RSTW* is a parallelogram. Explain.**



20. $\angle SRW \cong \angle WTS, \angle RST \cong \angle TWR$

21. $\angle TSZ \cong \angle RSZ, \angle TWZ \cong \angle RWZ$

22. $\overline{RS} \parallel \overline{WT}, \overline{RS} \cong \overline{WT}$

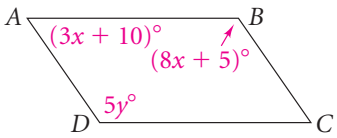
23. $\overline{RS} \parallel \overline{WT}, \overline{ST} \cong \overline{RW}$

24. $\overline{RS} \cong \overline{WT}, \overline{ST} \cong \overline{RW}$

25. $\overline{RZ} \cong \overline{TZ}, \overline{SZ} \cong \overline{WZ}$

Algebra **Find the values of the variables for which *ABCD* must be a parallelogram.**

26.



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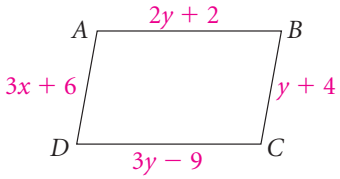

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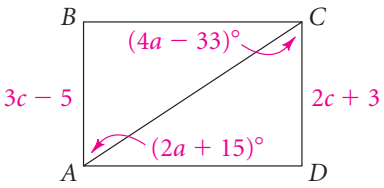

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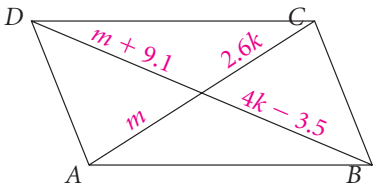
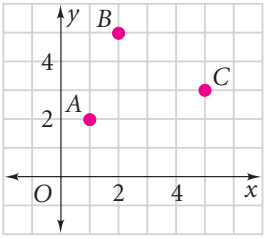


30. Open-Ended Sketch two noncongruent parallelograms $ABCD$ and $EFGH$ such that $\overline{AC} \cong \overline{EG}$ and $\overline{BD} \cong \overline{FH}$.

31. Probability If two opposite angles of a quadrilateral measure 120 and the measures of the other angles are multiples of 10, what is the probability that the quadrilateral is a parallelogram?

Coordinate Geometry **Given points *A*, *B*, and *C* in the coordinate plane as shown, find the fourth point described below.**



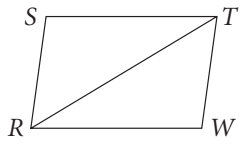
32. point D so that $ABCD$ is a parallelogram

33. point E so that $ABEC$ is a parallelogram

34. point F so that $AFBC$ is a parallelogram

35. Writing Summarize the ways to show that a quadrilateral is a parallelogram.

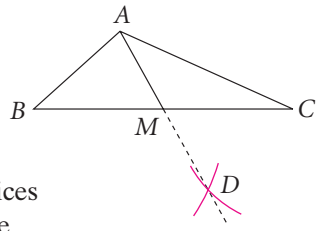
Challenge Proof **36.** Write a paragraph proof, a flow proof, or a two-column proof.



Given: $\triangle TRS \cong \triangle RTW$

Prove: $RSTW$ is a parallelogram.

Proof **37.** In the figure at the right, point D is constructed by drawing two arcs. One has center C and radius AB. The other has center B and radius AC. Prove that $\overline{AM}$ is a median of $\triangle ABC$.



38. Coordinate Geometry The diagonals of quadrilateral $EFGH$ intersect at $D(-1, 4)$. Two vertices of $EFGH$ are $E(2, 7)$ and $F(-3, 5)$. What must be the coordinates of G and H to ensure that $EFGH$ is a parallelogram?

Standardized Test Prep

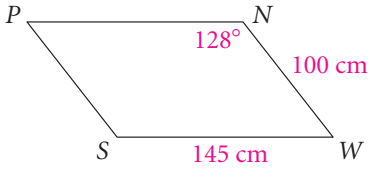
Multiple Choice

39. In $\square PNWS$, what is $m\angle W$?

A. 128 **B.** 90 **C.** 52 **D.** 26

40. In $\square PNWS$, what is $m\angle S$?

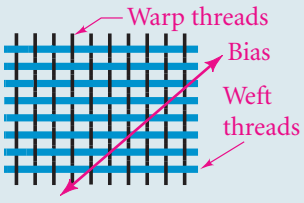
F. 128 **G.** 90 **H.** 52 **I.** 26



Reading Comprehension

Read the passage below, then answer the questions on the basis of what is *stated* or *implied* in the passage.

> Fabric is made by weaving threads vertically (the warp) and horizontally (the weft), forming small rectangles. Pull the fabric vertically or horizontally and it will not distort. The rectangles will remain as rectangles. Pull the fabric along its diagonals and parallel threads remain parallel but form small nonrectangular parallelograms.



41. What is formed by the warp and the weft?

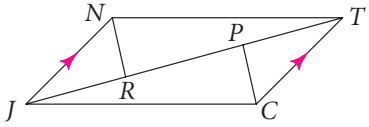
A. threads woven vertically **B.** threads woven horizontally
C. small rectangles **D.** nonrectangular parallelograms

42. How does pulling fabric along its diagonal affect the shape of the fabric?

F. It becomes a longer rectangle. **G.** It becomes a shorter rectangle.
H. It is no longer a rectangle. **I.** The shape is unchanged.

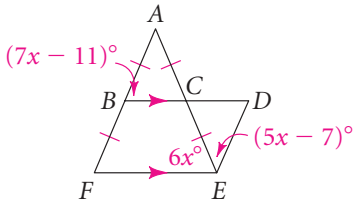
Short Response

43. Given: $\triangle NRJ \cong \triangle CPT$, $\overline{JN} \parallel \overline{CT}$
Prove: $JNTC$ is a parallelogram.



Extended Response

44. a. Write an equation and solve for x.
b. Is $\overline{AF} \parallel \overline{DE}$? Explain.
c. Is $BDEF$ a parallelogram? Explain.

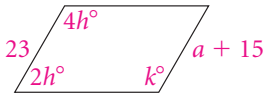


Take It to the NET
Online lesson quiz at **www.PHSchool.com**
Web Code: afa-0603

Mixed Review

Lesson 6-2 x^2 **Algebra** **Find the value of each variable in each parallelogram.**

45.



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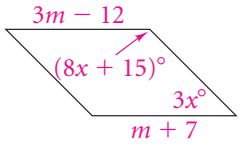

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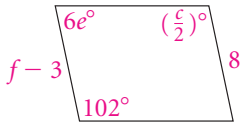
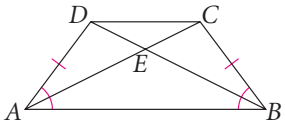


Lesson 4-7

48. Explain how you can use overlapping congruent triangles to prove $\overline{AC} \cong \overline{BD}$.



Lesson 2-2 **Write the two conditional statements that make up each biconditional.**

49. The diagonals of a quadrilateral bisect each other if and only if the quadrilateral is a parallelogram.

50. Two lines are parallel if and only if the two lines and a transversal form corresponding angles that are congruent.

51. Two nonvertical lines are perpendicular if and only if the product of their slopes is -1.